The Next Frontier: Mildew, Mold & Mycotoxins

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Mold Exposure and Its Alleged Effects

Mold[1]

What is it?

A naturally occurring microscopic organism and fungus which comes in thousands of varieties and ranges from harmless to toxic properties. The lack of chlorophyll allows mold to survive without sunlight, to multiply beneath and behind walls and to remain hidden without detection. Mold spores are very tiny and they can travel easily throughout the air without detection. These spores travel in and out of buildings and can attach to clothing and be transported from one site to another. Spores survive as long as they remain in the 40° to 100°F range.

Molds can grow on cloth, carpets, leather, wood, sheet rock insulation and human foods. Mold growth is exemplified by discoloration (white to orange and from green to brown then black). Most molds reproduce by making spores, which, if they land on a moist food source, can germinate and begin producing a branching network of cells called hyphae. Once the spores or fragments become airborne, individuals can be exposed through inhalation, digestion or skin contact.

How is Mold created?

Water seepage into buildings or internal water leaks are thought to be the primary causes of mold. Mold needs water, warmth (40° to 100°F) and a food source to live and multiply. Cellulose is a common compound in building materials and mold uses it as a food source. This explains why mold is commonly found on drywall, wallpaper, sheet rock and other cellulose-containing products. Stachybotrys is known to thrive off of cellulose and can spread very quickly.

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[1] For a comprehensive glossary of mold-related terms visit www.moldlab.com/glossary.htm.

When walls, ceilings and floors are damp and the lack of air flow prevents the area from drying, the mold is born and continues to grow until removed, remediated and the area is rehabilitated.

Why is mold a problem now?

Experts in the field almost universally agree that the following factors have either caused or contributed to the mold problem:

1. Newer buildings are more prone to entrap mold because they are more airtight and HVAC systems recirculate air without effective filtration;

2. Newer buildings include materials such as synthetic stucco products, exterior insulated finish systems (EIFS)[2] and other materials that trap moisture behind walls that provide the climate needed for growth and the fuel source for survival;

3. Mold and mildew are considered to be harmless byproducts of moisture build up and are not taken seriously by homeowners, builders and landlords until it spreads or becomes toxic; and,

4. Another line of thought is that due to the resistance of the human body to antibiotics, mold spores attack individuals who are immune suppressed which results in serious health effects.

What causes moisture problems?

It is almost impossible today in the construction industry to design and build a home, apartment building or commercial office space without allowing for some moisture to enter the ambient air. Notwithstanding the best controls, moisture can become a problem through the HVAC, plumbing or exterior cooling systems. Without moisture, mold simply cannot survive or multiply. The main sources of moisture are believed to include the following:

1. Moisture buildup in structures that are too tightly sealed or inadequately ventilated. The lack of circulation allows moisture to pool and soak into drywall, carpet or wood.

2. Building materials (drywall) do not allow moisture to easily escape in between the time from the retailer to the jobsite. Due to construction

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[2] EIFS products were targeted in two New Jersey cases filed during 2001. Melnick v. Jay D. Measley, AIA, *et al.*, No. MON-L-4056-01 (N.J. Super. Ct., Law Div., Monmouth Cty.); Zoffinger, *et al.* v. DKM Residential Corporation, *et al.*, No. L-1561-01 (N.J. Super. Ct., Law Div., Somerset Cty.)

deadlines, materials are placed directly on the structure without adequate time to "air out."

3. Roof leaks that allow water to enter the home either gradually or in large quantities. Once in the roof structure, the water can escape into the ventilation system, inner walls and substructure. Because the water has various entry routes, the resulting mold can be very difficult to detect.

4. Water buildup can occur if the exterior landscaping is not graded to discharge runoff from downspouts and eaves. Standing water in flower beds and low spots increases the chance of water seeping into basements.

5. Homes with nonvented combustion appliances (furnaces, water heaters, fireplaces, dryers) are likely to experience moisture buildup which creates the required environment for mold.

6. Properties with delayed or insufficient maintenance allow moisture to enter through windows, gutters, flashing, porches, terraces and patios.

7. Moisture sources inside the home from poor plumbing, exploding water tanks, defective water conditioners, poorly vented HVAC systems, along with the lack of ventilation in shower areas, are recognized as the most likely culprits for the inception and expansion of mold.

8. Flooding always presents moisture problems especially when home and building owners attempt to remodel some but not all of the affected areas.

9. Homeowners, building contractors and any construction related trade should consider any and all possibilities for moisture buildup in homes as a potential source for mold creation and expansion. Steps should be taken to eliminate moisture, remediate mold when found and implement proper ventilation when necessary. Otherwise, mold will continue to grow without detection and will be located only after complaints of medical problems.

Mold Properties

1) Fungal Spores - Occur naturally as mold grows and releases spores in the air. These spores then can attach to a viable food source and multiply until killed. Spores can also be inhaled or ingested by humans.

2) Fragments - When mold is disturbed or destroyed fragments of the spores are released and they can be inhaled. There is debate whether fragments can cause mold to grow or if they can be ingested or inhaled by humans.

3) Metabolites - Toxic properties that are released into the air as gases including mycotoxins and volatile organic compounds ("VOCs"). These gases are emitted from spores when the spore becomes mature or disturbed.

Types of Toxic Mold

stachybotrys chartarum

-black mold that is commonly found in homes inside the walls. (Made famous in Texas)
-reportedly linked to infant deaths near Cleveland, Ohio in 1994 (pulmonary hemorrhage) by the CDC. However, the CDC has recently retracted this case report.
-thought to be toxigenic mold which impacts nervous system
-not readily measured from air samples because spores stick together and not easily aerosolized
-easily overgrown in a sample and killed off by other molds
-high moisture requirement and grows vigorously
-low nitrogen requirement and grows on wet hay and straw, paper, wallpaper, ceiling tiles, carpets and insulation material (cellulose based)
-traced back to Russia where it was involved in the deaths of horses

aspergillus

-classifications include *parasiticus, flavus, fumigatus, versicolor* and *ochracens*
-yellow to green or black mold
-sometimes found on wooden furniture
-most toxic types include A. Parasiticus and A. Flavus that produce A. Flatoxins which are widely studied mycotoxins
-can be the most toxic substances that can affect the liver, brain, kidneys and heart under certain conditions

pennicillium

-classifications include *citrinum, expansum, viridicatum* and *cyclopium*
-colorless to green mold
-found on old oranges in refrigerator
-some types can produce toxins leading to itchy eyes, asthmatic reactions and other health problems
-fairly common indoors and its spores have the highest concentration of mycotoxins. Even when dead, this mold's spores can be toxic

cladosporium

-classifications include *sphaerospermum, cladosporioides* and *herbarum*
-dark brown to black mold
-prevalent on wood, textiles, painted surfaces, carpets and air duct liners
-may produce VOCs and noticeable odors
-may cause infections of the eye, skin, respiratory tract and from puncture wounds
-most common observed household mold observed around bathroom caulking and into ceilings

What Makes Mold Toxic

Molds can produce two types of metabolites: antibiotics and mycotoxins. Antibiotics are commonly exploited to create medicine to combat infections. Mycotoxins are created during the metabolic process which includes synthesizing molecules and enzymes. Once produced, mycotoxins can disrupt cellular structures and can interfere with protein, RNA and DNA. **Mycotoxins can be toxic to the cells of higher plants, animals and humans.** Mycotoxins can be found in both living and dead mold spores so handling precautions must be universal. To date, over 300 different types of mycotoxins have been identified by scientists. Mold can also produce volatile organic compounds as part of its metabolic process. These VOCs can also become hazardous if inhaled. Over 500 VOCs have been identified with the most common being ethanol. Some old species can also produce highly toxic gases from material they grown on. In one case, mold growing on wallpaper released arsen gas after ingesting arsenic pigment contained in the wallpaper.

Mycotoxins have been found to impact humans in the following ways:

Vascular system: hemorrhage of body tissues

Digestive system: vomiting, intestinal hemorrhage, fibrosis, anorexia

Respiratory system: respiratory distress, bleeding lungs

Nervous system: tremors, incoordination, depression, headache

Cutaneous system: rash, burning sensation of skin

Reproductive system: infertility

Immune system: suppression

How is Mold Harmful?

When spores from mold become airborne, they can get into the ventilation system. Because they are lightweight and very small, the spores can be recirculated by the HVAC system and escape normal filtration systems. As a result, mold may only be located in one floor or area of a building but can be spread throughout the structure via the HVAC system.

While in the air, these spores are inhaled and become lodged in the sinuses, trachea and lungs. This can result in allergic reactions, asthma and respiratory ailments. The spores can also be ingested leading to digestive problems. Spores can also cause skin allergic reactions. Some molds produce "mycotoxins" which inhibit or present growth of other organisms.

The list of ailments trying to be linked to mold exposure include the following: bleeding lungs; chronic respiratory ailments; chronic fatigue syndrome; asthma; severe memory loss; disorientation; behavioral changes; and cancer. The Center for Disease Control is studying mold to determine the type of mold-related ailments. While studies are ongoing, the health effects generally fall into four categories: allergy; infection; irritation and toxicity. However, any type of medical condition or ailment will be related to mold in hindsight once it is found in a building.

3 Types of Exposure Mechanisms

1) Inhalation (respiratory);

2) Physical Contact (dermal exposure); and/or

3) Ingestion (digestive)

As with most foreign substances, exposure alone does not place an individual at risk. Rather, there has to be a mechanism by which an individual is exposed with the foreign substance entering his or her body. With mold, it is generally upheld that spores enter the body through the airways.

Respiratory inhalation triggers more severe response to mycotoxins than digestive or dermal exposure. This is due to the lungs' attempt to clear the spores out of the airways which can trigger respiratory problems and inflamation of tissue.

Commonly Recognized Ailments from Mold Exposure

Organic Dust Toxic Syndrome (ODTS)

This medical condition is connected to mold because inhaled dust which contains fungi can produce flu-like symptoms. ODTS has occurred after one heavy exposure and does not require repetitive exposure over a period of time. Mold species Aspergillus and Penicillium are common causes of ODTS. ODTS has been documented in farm workers' handling mold tainted materials (hay, straw) and construction workers during renovation.

Hypersensitivity Pneumonitis (HP)

Lung condition which arises after repeated exposures to an allergen and may result in permanent lung damage if left untreated. Typically associated with repetitious exposures in farm workers and in office settings.

Allergy

This is the most frequently reported ailment related to mold exposure. Individuals who are genetically capable of producing an allergic response may develop allergies when their respiratory system or skin is exposed to molds spores or mold fragments. An individual's reaction to mold can range from mild responses to severe chronic illnesses. It has been determined that molds are just one of several sources of indoor allergens, including house dust mites, cockroaches, effluvia from domestic pets and microorganisms. Nevertheless, an attempt will be made by the individual to attribute his/her allergic reaction to mold notwithstanding the presence of these other sources.

Infection

Infection is not a common ailment that results from indoor mold. Individuals with a lowered immune system from disease or drug treatment (transplants, etc.) are more likely to be affected. The Aspergillus form of mold is thought to be a pathogen that can cause infection (Asperillus fumigatus). This type of infection can affect the skin, eyes, lungs and other organs and systems. Other outdoor fungi that can cause infection include Coccidioides, Histoplasma and Blastomyces (exposure from wind-borne or animal-borne contamination such as bats and birds).

Irritation

Once molds create their own metabolisms and are released into the air, the molds can produce volatile organic compounds which ultimately lead to the production of alcohols or aldehydes and acid molecules. In sufficient aggregate concentrations, these substances can irritate the mucous membrane of the eyes and respiratory system. The level of these volatile compounds may increase once the mold consumes building materials, paints, plastics and cleaners. At high levels, these compounds can impact the central nervous system producing symptoms such as headaches, attention deficits, the inability to concentrate and dizziness.

Miscellaneous Ailments

The most common symptoms associated with mold exposure include: runny nose, eye irritation, cough, congestion and aggravation of asthma.

Common symptoms of office workers and homeowners from fungal exposure (enclosed areas) include: fatigue, respiratory ailments, and eye irritation. Pulmonary hemorrhage in infants less than 6 months old was first discovered by the CDC in 1994 but this case study has been retracted by the CDC in a low published article. Individuals believed to be at a higher risk include: infants and children, elderly, immune compromised patients (HIV, chemotherapy patients) and pregnant women. Individuals who have pre-existing allergies and are then exposed to mold have been reported to suffer from: exacerbated wheezing, chest tightness, shortness of breath, nasal congestion and eye irritation.

Taking the Offensive: Detection and Remediation

Proper Detection of Mold

The construction industry is the primary target of mold claims. Whether it is new construction or remodeling, builders and contractors must become aware of mold and learn how to detect and remediate it in order to avoid liability. Detection is the critical step and will help to eliminate the builder's time being spent in litigation rather than on the job.

Visual Inspection: This is the easiest and most cost-effective method of locating and identifying possible mold contamination. This type of inspection can uncover water damage, excess moisture, mold and mold growth. As the initial step, all areas should be inspected including the ventilation systems, crawl spaces, hidden walls and attics. Inspectors should look for damp filters, damp conditions, overall cleanliness and examine all cellulosic surfaces (ceiling tiles, gypsum wallboard/Sheetrock, cardboard, paper) because they serve as a source of food. The use of a boroscope or a moisture meter may be helpful to view areas behind and inside walls, ductwork and other unreachable areas to determine the moisture content of certain materials.

Bulk/Surface Sampling: This type of detection method is best used when mold has been located and there is a need to identify specific fungal contaminants. Such a need may arise as part of a medical evaluation of occupants in a building or if a visual inspection can not be completed due to discoloration or staining. Bulk sampling should be performed by trained individuals and it consists of scraping or cutting materials from visibly moldy surfaces and placing the samples in a clean plastic bag. Surface sampling is less destructive and includes wiping the mold area with a sterile swab or stripping the area with clear tape. Once the sampling is completed, a certified lab must provide the results.

Air Monitoring: Air monitoring can create false negative results and, therefore, should not be used as a routine assessment. It can be useful when an individual has been diagnosed with a disease that can be associated with a specific type of fungal exposure. Air monitoring can also be helpful when contamination of ventilation systems are suspected, and, under this scenario, the sampling should be completed when the system is operating under normal conditions. When using air monitoring it is important to conduct outdoor sampling for comparative purposes and samples at all building air intakes should be included. Without establishing background levels, you will not have a baseline should litigation ensue.

Can any Environmental Lab do the testing?

While there are no specific mold testing requirements for environmental labs at this time, there is universal agreement that microscopic identification of spores and spore colonies requires considerable expertise. This type of service is not routinely available in most labs because of the level of documented quality control that is needed for bulk/surface and air samples. The American Industrial Hygiene Association (AIHA) now offers accreditation to microbial laboratories known as Environmental Microbiology Laboratory Accreditations Program (EMLAP). Once accredited, these labs must participate in quarterly proficiency testing known as Environmental Microbiology Proficiency Analytical Testing Program (EMPAT). To protect against attacks on the results of testing, an accredited lab must be used for all samples.

Removal and Remediation of Mold[3]

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[3] Recently, newspapers across America have contained advertisements from contractors that offer duct work cleaning services. The USEPA has recently launched a probe into this area because the antimicrobial pesticides used by these companies

Mold has not officially come under the regulatory control of OSHA, NIOSH or the EPA although there has been recent discussion about federal legislation. However, it is now universally recognized that industry standards prevail and the standards affirmatively require the use of specially trained individuals to remediate extensive mold contamination. This is an evolving field but certification is now available and the industry recommends that all air sampling data be interpreted by qualified labs.

> Pursuant to industry standards, remediation strategies must be based on the elimination of conditions that promote, encourage and sustain mold growth. Removal must include cleaning affected areas, decontaminating the HVAC systems, removing contaminated materials and repairing or replacing damaged materials or structures. It is also recommended that the environmental conditions in the affected areas be modified to improve ventilation and to eliminate incubators for mold. To fully abate mold, the industry recommends the control and total elimination of moisture. The failure to eliminate moisture will lead to new mold colonies at possible increased strength.

The New York City Mold Guidelines[4]

Some municipalities and states have started to examine mold issues. In 1993, the New York City Department of Health, the New York City Human Resources Administration and the Mt. Sinai Occupational Health Clinic developed policies for medical and environmental evaluation and intervention in order to address mold contamination. In litigation, it is likely that defendants will be held to the New York guidelines because any expert will have to concede them to the equivalent of an "industry standard." These standards have been updated and the New York City Health Department has created the following remediation classifications and protocols:

***Level I*: Small Isolated Areas** (10 sq. ft or less e.g. ceiling tiles, small areas on walls)

a. Remediation can be conducted by regular building maintenance staff. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

b. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should be worn.

c. The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12

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are not approved for use in ventilation systems. Improper use of these cleaners has already led to personal injuries and numerous evacuations.

[4] New York City Heath Department's guidelines can be viewed at www.ci.nyc.ny.us/html/doh/html/epi/moldrpt1.html.

months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

d. Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

e. Contaminated materials that cannot be cleaned should be removed from the building in a sealed plastic bag. There are no special requirements for the disposal of moldy materials.

f. The work area and areas used by remedial workers for egress should be cleaned with a damp cloth and/or mop and a detergent solution.

g. All areas should be left dry and visibly free from contamination and debris.

***Level II*: Mid-Sized Isolated Areas** (10-30 sq. ft. e.g. individual wallboard panels.)

a. Remediation can be conducted by regular building maintenance staff. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

b. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should be worn.

c. The work area should be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

d. The work area should be covered with a plastic sheet(s) and sealed with tape before remediation, to contain dust/debris.

e. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

f. Contaminated materials that cannot be cleaned should be removed from the building in sealed plastic bags. There are no special requirements for the disposal of moldy materials.

g. The work area and areas used by remedial workers for egress should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution.

h. All areas should be left dry and visibly free from contamination and debris.

***Level III*: Large Isolated Areas** (30 - 100 square feet e.g., several wallboard panels.)

A health and safety professional with experience performing microbial investigations should be consulted prior to remediation activities to provide oversight for the project.

The following procedures *at a minimum* are recommended:

a. Personnel trained in the handling of hazardous materials and equipped with respiratory protection, (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should be worn.

b. The work area and areas directly adjacent should be covered with a plastic sheet(s) and taped before remediation, to contain dust/debris.

c. Seal ventilation ducts/grills in the work area and areas directly adjacent with plastic sheeting.

d. The work area and areas directly adjacent should be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

e. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

f. Contaminated materials that cannot be cleaned should be removed from the building in sealed plastic bags. There are no special requirements for the disposal of moldy materials.

g. The work area and surrounding areas should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.

h. All areas should be left dry and visibly free from contamination and debris.

i. If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the fungi is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level IV are followed.

***Level IV*: Extensive Contamination** (greater than 100 contiguous square feet area)

A health and safety professional with experience performing microbial investigations should be consulted prior to remediation activities to provide oversight for the project. The following procedures are recommended:

a. Personnel trained in the handling of hazardous materials equipped with:

    i. Full-face respirators with high efficiency particulate air (HEPA) cartridges;

    ii. Disposable protective clothing covering both head and shoes; and,

    iii. Gloves.

b. Containment of the affected area:

  i. Complete isolation of work area from occupied spaces using plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings);

  ii. The use of an exhaust fan with a HEPA filter to generate negative pressurization; and,

  iii. Airlocks and decontamination room

c. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

d. Contaminated materials that cannot be cleaned should be removed from the building in sealed plastic bags. The outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building. There are no special requirements for the disposal of moldy materials.

e. The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.

f. Air monitoring should be conducted prior to occupancy to determine if the area is fit to reoccupy.

Level V: Remediation of HVAC Systems

A Small Isolated Area of Contamination (<10 square feet) in the HVAC System

a. Remediation can be conducted by regular building maintenance staff. Such persons should receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

b. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection should be worn.

c. The HVAC system should be shut down prior to any remedial activities.

d. The work area should be covered with a plastic sheet(s) and sealed with tape before remediation, to contain dust/debris.

e. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.

f. Growth supporting materials that are contaminated, such as the paper on the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be removed in sealed plastic bags. There are no special requirements for the disposal of moldy materials.

g. The work area and areas immediately surrounding the work area should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.

h. All areas should be left dry and visibly free from contamination and debris.

i. A variety of biocides are recommended by HVAC manufacturers for use with HVAC components, such as, cooling coils and condensation pans. HVAC manufacturers should be consulted for the products they recommend for use in their systems.

Areas of Contamination (>10 square feet) in the HVAC System

a. A health and safety professional with experience performing microbial investigations should be consulted prior to remediation activities to provide oversight for remediation projects involving more than a small isolated area in an HVAC system. The following procedures are recommended:

b. Personnel trained in the handling of hazardous materials equipped with:

    i. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended.

    ii. Gloves and eye protection

    iii. Full-face respirators with HEPA cartridges and disposable protective clothing covering both head and shoes should be worn if contamination is greater than 30 square feet.

c. The HVAC system should be shut down prior to any remedial activities.

d. Containment of the affected area:

    i. Complete isolation of work area from the other areas of the HVAC system using plastic sheeting sealed with duct tape.

ii. The use of an exhaust fan with a HEPA filter to generate negative pressurization.

iii. Airlocks and decontamination room if contamination is greater than 30 square feet.

e. Growth supporting materials that are contaminated, such as the paper on the insulation of interior lined ducts and filters, should be removed. Other contaminated materials that cannot be cleaned should be removed in sealed plastic bags. When a decontamination chamber is present, the outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. There are no special requirements for the disposal of moldy materials.

f. The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.

g. All areas should be left dry and visibly free from contamination and debris.

h. Air monitoring should be conducted prior to re-occupancy with the HVAC system in operation to determine if the area(s) served by the system are fit to reoccupy.

i. A variety of biocides are recommended by HVAC manufacturers for use with HVAC components, such as, cooling coils and condensation pans. HVAC manufacturers should be consulted for the products they recommend for use in their systems.

American Conference of Governmental Industrial Hygienist (ACGHI)

In its recent publication *Bioaerosols: Assessment and Control*, the ACGHI provides recommendations for the remediation of microbial contamination. The ACGHI's standards include the following:

> "When visible microbial contaminations is extensive, containment procedures similar to those used to handle hazardous wastes (e.g. asbestos) are required to safely remove contaminated materials."
>
> "Proper precautions to eliminate release of biological agents that may compromise the health of workers and remediation workers."

The Bioaerosol Committee of the ACGHI has found outdoor airborne fungi conditions sometimes exceed 1,000 colony-forming units (CFU) per cubic meter of air (m 3) and may average 10,000 CFU/m3. Other researchers have proposed an indoor standard of 200 CFU/m3 but this level has not been universally accepted. There is no universally accepted level for mold exposure and scientists may still be many years away from establishing a TLV or PEL standard.

The Next Frontier: Legal Claims and Litigation From Mold Exposure

Mold litigation is quickly becoming one of the fastest growing fields of litigation. Some legal analysts predict mold to generate more claims than asbestos. Most of the mold litigation to date has occurred in Texas and California which have climates that encourage growth of various forms of mold throughout the year. In response to this new field of litigation, the Defense Research Institute ("DRI"), a national association of defense lawyers and insurance companies, has formed a substantive law group ("SLG") committee to track mold litigation and its progress. The SLG is part of DRI's Toxic Torts and Environmental Law Committee and is known as the Indoor Air Quality ("IAQ") group. Through its national network, information on lawsuits, verdicts and new scientific developments are shared with IAQ members. Steptoe & Johnson is an active member of the IAQ and has valuable access to the latest mold developments.

Who can be sued over mold exposure?

In the cases filed to date, injured individuals and property owners have sued the following types of defendants: home builders; real estate agents; architects; engineers; HVAC maintenance and repairmen; employers; landlords (residential and commercial); home environmental inspectors; and boards of education. In reality: anybody in the chain of construction, selling, owning or remodeling. In fact, some manufacturers of building products are becoming targets under the theory that mold spores were contained in the products when they left the factory. Insurance companies are facing liability and bad faith claims based on their failure to provide coverage for property damage and personal injury claims. Everybody is a target, especially in West Virginia.

In a case[5] of first impression, a New Jersey family has included their lawyer as a defendant in their mold claim. The family alleges damage to their pulmonary systems, allergic conjunctivitis, nosebleeds, frequent colds, coughing fits and elevated white blood cell counts. The mold culprit was hidden stachybotrys in the family's home which was extensively renovated by the defendant owner real estate investment firm. Allegations against the family's lawyer include: failure to recommend an independent home inspection before purchase; failure to check on the retention of proper permits; and, sending an unlicenced legal assistant to the closing. This case will have a profound impact on real estate law if the legal malpractice claim is successful.

What do mold plaintiffs allege?

The personal injury claimants allege the mold in their homes or workplace has caused them physical injuries, pain and suffering, lost income, lost of enjoyment of life, to incur *past and* future medical costs and testing and other damages. They assert they were negligently or intentionally exposed to mold and the defendants had a duty to detect, test and remove the mold before it started causing their illness.

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[5] Cherry v. Four "R" Investments, *et al.*, No. L-5022 (N.J. Super. Ct., Monmouth Cty.).

The property damage claimants assert their homes or buildings were improperly designed, improperly built, or improperly ventilated and as a result they incurred cleaning costs, lost profits, are exposed to liability from employees and tenants and have an unmarketable/inhabitual structure. In the banking industry, financial institutions face significant losses when buyers of homes refuse to accept title because mold is found during the home inspection. For new homes, banks are sometimes left holding the title once the home is completed but the buyers refuse to take possession.

Insurance companies are also being targeted mostly for their failure to properly adjust and pay mold claims related to personal injuries and property damage. Mold has created a new genre of bad faith claims and significant verdicts against insurers have already occurred. Insurance companies now seek reform from their state insurance commissioners and legislative bodies.

Liability of Builders and Contractors for New Homes or Buildings

In West Virginia, builders and contractors will face a myriad of claims from new homeowners, remodeling and remediation clients and possibly from their own employees and independent contractors. Most of these injury claims will be premised on negligence. Negligence means the plaintiffs will assert the builder or contractor owed them a duty, that this duty to them was breached and as a proximate cause, they were injured by the builders/contractors' conduct. Again, the plaintiffs will attribute any moisture buildup and resulting mold growth to the builder's negligence and it will be very easy to locate an expert to opine in hindsight that things could have been done better to prevent the problem.

The four broad areas of potential liability for new homes are breach of contract, negligent design, negligent construction and violation of applicable building codes and law. Under West Virginia law, it is likely that plaintiffs will assert the following theories against builders and contractors:

-failure to eliminate moisture collection and content in materials before being installed
-failure to deliver home which is sealed and leak proof
-failure to design proper ventilation and controls
-failure to construct home in workmanlike manner (leaks, etc.)
-building of false walls which allow mold to proliferate and hide
-failure to transfer title of mold free home that is habitable (breach of contract)
-failure to construct home which complies with all local, state and federal building codes and within recognized industry standards

Liability of Builders and Contractors for Remodeling and Remediation of Homes and Offices

With low interest rates, the availability of home equity loans and the existence of many older homes, remodeling is a multi-billion dollar industry. Remodeling, just like new home construction, exposes builders and contractors to liability much in the same way as new home construction. However, remodeling poses additional risks including:

-failure to identify mold and take proper precautions at the outset
-failure to locate and eliminate the source of moisture to prevent recurrence
-failure to update and streamline ventilation system

-failure to correct improper drainage
-disturbing mold without testing for hazardous nature and instituting remediation controls
-failure to perform clean up and conduct swipe testing if mold was discovered
-failure to inform home/building owner of existing problem
-negligently hiring remediation company that was not certified to handle mold

Liability for My Employees? I have Workers' Compensation"

Beyond the Immunity of Workers' Compensation

We are all aware of the exception to employers' absolute immunity of workers' compensation. To summarize, the deliberate intent or Mandolidis exception recognizes that immunity is lost when:

i. proof of actual malice or intent to injure (Mandolidis)

ii. statutory five step process is satisfied (W.Va. Code §23-4-2(c)(ii)(A-E)

- specific unsafe working condition
- subject realization that unsafe working condition could cause serious injury or death
- unsafe working condition violates federal or state law or industry standard
- notwithstanding having knowledge of the unsafe working condition employee still exposed to condition
- employee suffers serious injury or death as a result of the working condition

In mold cases the workers and contract employees will allege that mold qualifies as a specific unsafe working condition. However, the workers will have a difficult time proving subject realization on the part of the builder/contractor until the health hazards become more widely known in the industry. The three remaining elements can be met under certain factual conditions. If the contractor finds and remediates the mold, the workers and contract employees will argue that subjecting them to additional exposure, post-remediation, meets the unsafe working condition requirement and the remaining elements. Therefore, any builder/contractor must be certain that each mold problem has been eradicated before resuming operations in the premises and that maximum safety precautions have been taken.

Negligent infliction of emotional distress (Marlin v. Bill Rich Const., et al.)

i. must prove that plaintiff was actually exposed to the disease by the negligent conduct of the defendant

ii. that plaintiff's serious emotional distress was reasonably foreseeable

Reasonably foreseeable - Exposure raises a medically established possibility of contracting a disease; and,
- The disease will produce death or substantial disability requiring prolonged treatment to

mitigate and manage or promising imminent death

iii. the plaintiff actually suffered emotional distress as a direct result of the exposure

iv. **in Marlin, the West Virginia Supreme Court ruled that a worker's fear of future disease claim, once sufficiently exposed, was not compensable under the West Virginia Workers' Compensation Act. This decision means that a worker may possibly file a civil action against his employer for this tort once she or he is exposed to sufficient levels of mold.**

v. Under Marlin any person exposed to mold could claim emotional distress even though the current science does not support the contention that death or substantial disability results from exposure. However, because the Marlin standard only requires the plaintiff to prove the possibility of disease, the mold-based claim may still get to the jury.

Medical Monitoring (Bower v. Westinghouse Corp.)

Elements:

i. the plaintiff has been significantly exposed to a proven hazardous substance through the tortuous conduct of the defendant

ii. as a proximate result of the exposure, the plaintiff has suffered an increased risk of contracting a serious latent disease relative to the general population

iii. the increased risk of disease makes it reasonably necessary for the plaintiff to undergo periodic diagnostic medical examination different from what would be prescribed in the absence of the exposure

iv. monitoring procedures exist that make the early detection of a disease possible

Employer Sponsored Medical Surveillance Program v. Workers' Comp (if applicable)

In the states where most mold claims have been previously filed, employers have considered the feasibility of instituting voluntary medical surveillance programs in order to avoid the onslaught of civil claims. The following factors have been examined when making this decision:

a. evaluate cost effectiveness of establishing private surveillance program with local pulmonologist and allergist and determine how long surveillance is required for each individual

b. convince workers that disclosure of medical conditions is needed to help builder/contractor make an informed decision in returning to building and detecting future problems

c. ultimate advantage: getting medical baseline of employees now to defend future claims (comp or civil)

When faced with this issue, careful consideration should be given to the advantages and disadvantages of entering West Virginia's civil litigation system. A concise and well thought out voluntary surveillance program will likely be less aggressive, less disruptive to the business and cause less contention between the workers and management.

THINGS TO CONSIDER IF MOLD RUNNETH YOU OVER

Remediation Efforts

a. keep a detailed summary of efforts to date and the building owner's refusal to correct any problem you recommend. For a building owner, all estimates and explanations should be reduced to writing.

b document where the mold was found, the location of the mold in relation to employees, tenants, etc. and the source of moisture.

c. determine if the I.H. or Firm is trained or certified in mold detection/removal.

d. were industry standards followed during evaluation, detection and removal (New York guidelines).

e. what are the short and long term plans for air sampling, indoor air quality studies and detection (follow industry or ACGIH standards).

Public Relations

a. establishing point person from builder/contractor or building owner to discuss mold situation with one selected union/management employee or tenant to be a conduit for information.

b. encourage employees and tenants with ailments to come forward and check their own homes or work places for mold because it is most common in households.

c. avoid relating health ailments to mold until you understand the circumstances of exposure and the alleged ailments.

d. act quickly to address the problem and focus any media inquiry to the likelihood the mold is presumed harmless until lab results are received.

e. emphasis should be on the medical community's inability to predict or explain the relationship between mold and alleged ailments.

Spoliation of Evidence

a. anticipate workers or tenants will allege that builder/contractor or landlord destroyed evidence or altered the air sample results in an attempt to undermine their claims.

b. builder/contractor must preserve any evidence that may be asked for by the workers and tenants in the future or that will be essential to their anticipated claims .

c. photograph and videotape pre- and post-remediation conditions and location of workers/tenants to mold and ventilation system.

Insurance

Which Policy Covers?

Commercial General Liability ("CGL") will be applicable, if at all, to mold claims. Builders' risk policies usually do not apply because mold infestations occur almost always after the project is complete. Contractors are not entitled to coverage from the owner's homeowner's policy because of the insurance contract terms. However, contractors may face subrogation claims from homeowner's insurers when remodeling or construction causes mold and the homeowner is paid for injuries and/or remediation work.

Is Mold Covered by CGL Policy?

To understand the answer to this question, we need to summarize how one is exposed to mold. Mold releases spores into the ambient air and these spores are then inhaled or ingested by individuals which, in theory, then cause a multitude of injuries and conditions.

Every CGL policy contains a "pollution exclusion." However, most courts are hesitant to apply this exclusion to mold. These courts view mold as a biological agent which falls outside the definition of pollutant as contained in CGL policies ("pollutant" is defined as an "irritant, contaminant or chemical"). Furthermore, the pollution exclusion only applies to bodily injuries and not to property damage. As a result, CGL policies may provide coverage for clean up of mold contamination, repairs for clean up and future preventative measures.

West Virginia has not reviewed whether CGL policies will be interpreted to cover personal injury and property damage claims related to mold. However, the current national trends favor coverage and West Virginia will likely follow.

What to Look Out For?

Some carriers have promulgated endorsements to be used in their CGL policies to exclude coverage for mold claims. An example of such an endorsement is as follows:

> **Fungus, Mildew and Mold Exclusion**
>
> **This insurance does not apply to:**
>
> **1. "Bodily injury," "property damage," "personal or advertising injury," or "medical payments" arising out of, resulting from, caused by, contributed to, attributed to, or in**

any way related to any fungus, mildew, mold or resulting allergens;

2. **Any costs or expenses associated, in any way, with the abatement, mitigation, remediation, containment, detoxification, neutralization, monitoring, removal, disposal or any obligation to investigate or assess the presence or effects of any fungus, mildew, mold or resulting allergens; or**

3. **Any obligation to share with or repay any person, organization or entity, related in any way to items 1 and 2.**

Such an endorsement would most likely eliminate coverage and insureds should be on the look out for such endorsements to their policies, at the time of renewal. Right now, they appear to be in sporadic use.

Is Insurance Coverage Available for Potential Mold Claims?

Some carriers are contemplating coverage for mold under Pollution Legal Liability (PLL) and Contractor's Pollution Liability (CPL) policies, expressly extending the definition of pollutant to include fungi and bacteria matter which produces the release of spores or the splitting of cells, including mold, mildew and viruses. However, it appears that such coverage may be provided only with minimal policy limits. Alternatively, in order to obtain higher policy limits, an additional premium may be charged from a case-by-case basis. Still other carriers may not offer such coverage or enhancements at all.

Location of Mold Claims and Litigation

Mold has been identified in almost every state and the following jurisdictions currently have active mold claims or litigation:

West Virginia
California
Texas
Indiana
Nevada
South Carolina
Illinois
Michigan
Florida
Louisana
Kentucky
Wisconsin
Missippi
Arizona
Colorado
Washington
Georgia
New Jersey
Idaho
South Dakota
Oregon
North Dakota
Missouri
Nebraska
Ohio
New York
Maine

New Mexico
Kansas

Mold problems have now surfaced on a world-wide scale including:

United States
United Kingdom
Canada
Japan
Malaysia
Russia
Germany

An example of the propensity for mold claim growth is in the San Antonio, Texas area. At least six homes a week are tested for mold with two of these homes requiring professional cleaning and remediation. One remediation company has reported inspecting and cleaning over 1,000 schools since 1997.

Verdicts and Recent Findings

Mary Ballard, et al. v. Fire Ins. Exchange, et al.

Date: June 1, 2001

Jurisdiction: Travis County, Texas

Facts: Couple's home developed a series of plumbing leaks that resulted in a massive infection by mold (stachybotrys). Couple alleged personal injuries (headaches, dizziness, fatigue, respiratory and sinus problems, bloody noses and cognitive dysfunctions) and that their homeowner's policy covered their injuries. Fire Insurance was sued for negligence, misrepresentation, fraud and breach of contract.

Demand: $100,000,000.00

Verdict: Judge did not allow jury to consider health problems (Daubert) at trial because experts did not meet Daubert requirements. Nevertheless, jury awarded the plaintiffs $32,000,000.00 against Fire Industrial for failing to provide coverage, mental anguish and punitive damages.

Mold Result: As a result of the infestation, the home will be decontaminated, razed and rebuilt.

Update: Mediation was recently tried and it failed. Mary Ballard, when asked about the progress made in mediation, stated "I will give them hell until the day I die. And I'm sure they hope that happens sooner than later."

Mazza, et al. v. Raymond Schwartz, et al.

Date: November 7, 2001

Jurisdiction: Sacramento, California

Facts: Darren Mazza, his wife and his son were repeatedly hospitalized for injuries allegedly caused by mold. The plaintiffs' injuries included breathing problems, severe headaches and gastrointestinal problems. Medical bills totaled more than $11,000.00. The defendants included the owners of the apartments and the managers of the building. Plaintiffs alleged they were exposed to mold for several years from a leaking toilet in an upstairs apartment. Plaintiffs asserted the defendants fixed the toilet but did not remove the mold.

Verdict: $2,700,000.00

- $110,000.00 past medicals
- $105,000.00 future medical monitoring
- Remainder for pain and suffering, etc.

Mold Impact: Illustrates the broad web of possible defendants

Nicholson, et al. v. Metro Property Management, et al.

Date: November 9, 2001

Jurisdiction: Baltimore County Circuit Court, Maryland

Facts: Katheryn and Michael Nicholson and their 4-year old son alleged mold exposure and sued their condominium owner, property manager and condominium association. Plaintiffs alleged that mold grew throughout the condo unit from steam which originated from extreme hot water that ran for 10 days in above condo. Plaintiffs' son developed mold allergy and was in the hospital for 3 weeks to have bile duct repaired. Defendants contended no shared HVAC system, only 10 days of exposure and no relation between exposure and injuries. Plaintiffs claimed that son's bile duct injury was caused by mold even though he had liver transplanted as an infant. Plaintiffs claimed $73,000.00 in medical bills and $98,000.00 in economic losses.

Verdict: $219,000.00

- considered a win by the defendants

Mold Impact: Allows non-related health conditions to be attributed to mold

California Courthouse Litigation

Jurisdiction: Tulane County, California

Facts: State district court judge alleges mold exposure from defective HVAC and curtain wall systems. He alleges these systems allowed stachybotrys mold to grow. 100 other courthouse employees have joined the action alleging fraud and concealment. Defendants include the construction manager, general contractors, subcontractors and designers of the 1989 construction project.

Status: Case is still pending.

Impact: Shows how quickly a "mass" tort can grow out of one exposure allegation. It also illustrates long term liability.

Glendale Litigation

Jurisdiction: Maricopa County, Arizona

Facts: Homeowners sued their homebuilder alleging faulty design and workmanship created leaks and water infiltrated their homes.

Verdict: For plaintiffs in the amount of $680,000.00.

"The home-building industry has not won a single construction defect case involving multiple homes in Maricopa County." - Arizona Republic 11/27/01

Legislative Mold Front

Mold litigation and health fears have lead some states to enact legislation aimed at creating new disclosure requirements for landlords and commissions to study the health risks associated with mold. The legislative enactments include:

California Senate Bill 732 and Assembly Bill 284 (effective January 1, 2001)

Maryland Senate Bill 283

Washington (bill recently passed)

New Jersey (bill recently passed)

Texas (proposed legislation House Bills 2006, 2007 and 2008)

Sources and Recommended Web Sites and Articles

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